PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 4: NATURAL SELECTION AND GENETIC MODIFICATION (PACK 4)

SCORE	PERCENTAGE
/94	%

STEMUP

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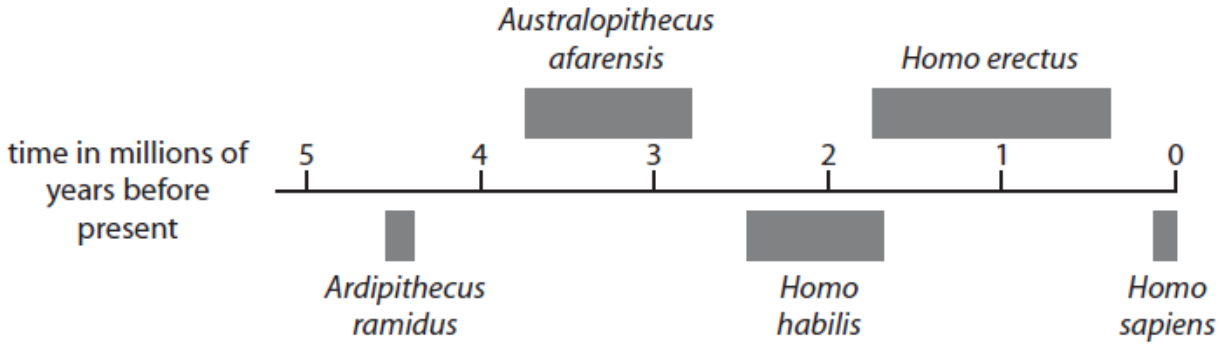
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Q1.

Human evolution and behaviour

The timeline shows when *Homo sapiens* and some of their ancestors are thought to have inhabited the Earth.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The species which is thought to have inhabited the Earth for the longest period of time is

(1)

☒ **A** *Australopithecus afarensis*

☒ **B** *Homo erectus*

☒ **C** *Homo habilis*

☒ **D** *Homo sapiens*

(ii) Estimate the number of years that *Homo habilis* inhabited the Earth.

(1)

.....

(b) Scientists in Africa discovered part of a fossilised skull.

The skull was identified as belonging to the species *Homo erectus*.

Describe the methods scientists may have used to identify the skull as belonging to the species *Homo erectus*.

(2)

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(c) *Homo sapiens* evolved in Africa and then migrated to other areas of the world.

Mitochondrial DNA analysis can be used to map human migration.

Compare the benefits of using mitochondrial DNA rather than nuclear DNA to map human migration.

(3)

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(d) One group of *Homo sapiens* migrated to an environment where there was a large waterfall.

At first, the noise of the waterfall kept them awake at night but they got used to the noise over time.

Explain this behavioural response.

(2)

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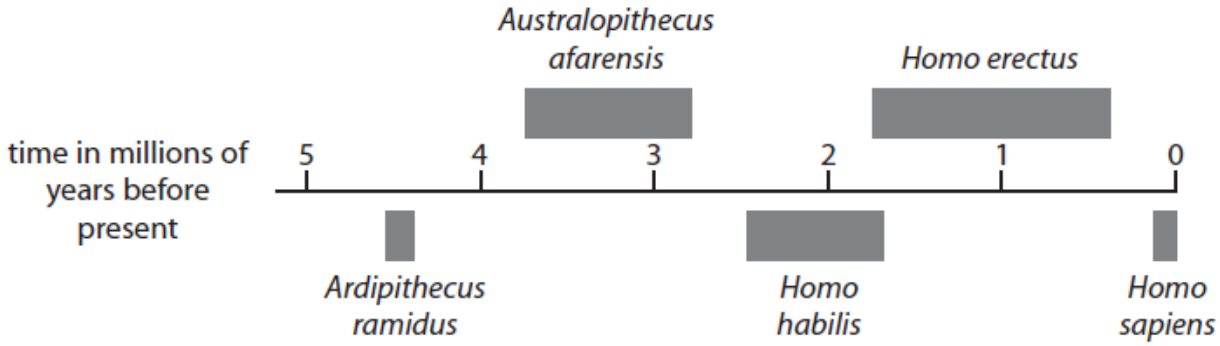
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(Total for question = 9 marks)

Q2.

Human evolution and behaviour

The timeline shows when *Homo sapiens* and some of their ancestors are thought to have inhabited the Earth.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The species which is thought to have inhabited the Earth for the longest period of time is

(1)

☒ **A** *Australopithecus afarensis*

☒ **B** *Homo erectus*

☒ **C** *Homo habilis*

☒ **D** *Homo sapiens*

(ii) Estimate the number of years that *Homo habilis* inhabited the Earth.

(1)

.....

(b) Scientists in Africa discovered part of a fossilised skull.

The skull was identified as belonging to the species *Homo erectus*.

Describe the methods scientists may have used to identify the skull as belonging to the species *Homo erectus*.

(2)

.....

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Compare the benefits of using mitochondrial DNA rather than nuclear DNA to map human

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(3)

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At first, the noise of the waterfall kept them awake at night but they got used to the noise over time.

Explain this behavioural response.

(2)

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(Total for question = 9 marks)

Q3.

The diagram shows four Stone Age tools discovered at different archaeological sites in Europe.

			
handaxe	arrow head	cutting stone	hammer stone

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The Stone Age tool made most recently is the

(1)

☒ **A** handaxe

☒ **B** arrow head

☒ **C** cutting stone

☒ **D** hammer stone

(ii) Suggest how these tools may have helped early humans to survive.

(2)

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Q4.

The diagram shows four Stone Age tools discovered at different archaeological sites in Europe.

			
handaxe	arrow head	cutting stone	hammer stone

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The Stone Age tool made most recently is the

(1)

☒ **A** handaxe

☒ **B** arrow head

☒ **C** cutting stone

☒ **D** hammer stone

(ii) Suggest how these tools may have helped early humans to survive.

(2)

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Q5.

Describe how fossil evidence can be used to show that humans have evolved.

(2)

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Q6.

Describe how fossil evidence can be used to show that humans have evolved.

(2)

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Q7.

Organisms can be classified by the five kingdom or three domain method.

(i) What is the name of the domain that plants belong to?

(1)

☒ **A** Eukarya

☒ **B** Archaea

☒ **C** Monera

☒ **D** Protista

(ii) Plant cells contain chloroplasts.

What happens in a chloroplast?

(1)

☒ **A**	oxygen produced	sunlight absorbed by chlorophyll
☒ **B**	carbon dioxide produced	sunlight absorbed by mitochondria
☒ **C**	oxygen produced	sunlight absorbed by mitochondria
☒ **D**	carbon dioxide produced	sunlight absorbed by chlorophyll

(iii) Give a reason why the three domain method of classification has been suggested.

(1)

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.....

(Total for question = 3 marks)

Q8.

Answer the question with a cross in the boxes you think are correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Organisms can be classified by the five kingdom or three domain method.

(i) What is the name of the domain that plants belong to?

(1)

☒ **A** Eukarya

☒ **B** Archaea

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(ii) Plant cells contain chloroplasts.

What happens in a chloroplast?

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☒	**B**	carbon dioxide produced	sunlight absorbed by mitochondria
☒	**C**	oxygen produced	sunlight absorbed by mitochondria
☒	**D**	carbon dioxide produced	sunlight absorbed by chlorophyll

(iii) Give a reason why the three domain method of classification has been suggested.

(1)

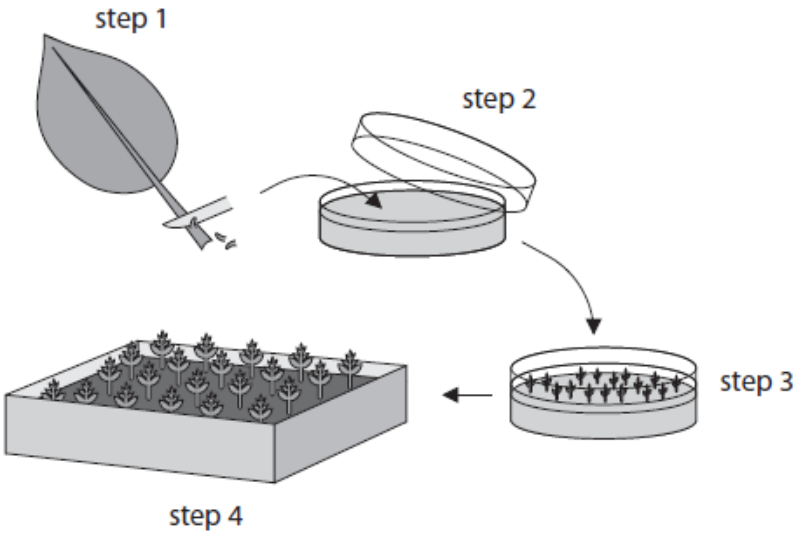
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(Total for question = 3 marks)

Q9.

Figure 8 shows a method of producing plants.



Step 1. Cells taken from parent plant.

Step 2. Cells placed on agar growth medium.

Step 3. Cells develop into tiny plantlets.

Step 4. Plantlets grown in compost.

Figure 8

(i) Some cells in each plantlet develop into root cells.

Name the process occurring as these cells develop into root cells.

(1)

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(ii) Describe the advantages of producing plants by the method shown in Figure 8.

(2)

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(iii) An autoclave is used to prepare the agar growth medium used in Step 2.

Explain why the agar growth medium is autoclaved.

(2)

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(iv) One of the plantlets had different coloured leaves.

Give **one** reason why this plantlet had different coloured leaves.

(1)

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(Total for question = 6 marks)

Q10.

In 2017, a new strain of *Klebsiella pneumoniae* bacteria was discovered that was resistant to 26

different antibiotics.

(i) Explain how *Klebsiella pneumoniae* bacteria developed resistance to antibiotics.

(4)

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(ii) State how the use of antibiotics could contribute to *Klebsiella pneumoniae* bacteria developing resistance to antibiotics.

(1)

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(iii) *Klebsiella pneumoniae* is a prokaryotic cell.

Which is a characteristic feature of a prokaryotic cell?

(1)

☒ **A** it has chloroplasts

☒ **B** it does not have a nucleus

☒ **C** it does not have ribosomes

☒ **D** it cannot reproduce without a host

(Total for question = 6 marks)

Q11.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The formation of a new species due to geographical isolation is called

(1)

- ☒ **A** adaptation
- ☒ **B** competition
- ☒ **C** hybridisation
- ☒ **D** speciation

Q12.

Complete the sentence by putting a cross (☒) in the box next to your answer.

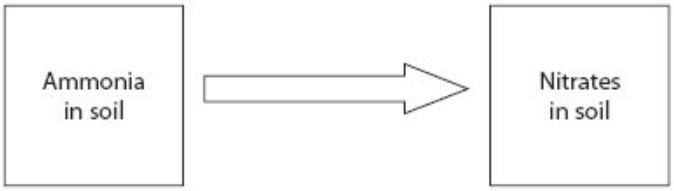
The formation of a new species due to geographical isolation is called

(1)

- ☒ **A** adaptation
- ☒ **B** competition
- ☒ **C** hybridisation
- ☒ **D** speciation

Q13.

The diagram shows one of the stages of the nitrogen cycle.



(a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The name of this stage is

(1)

- ☒ **A** decomposition
- ☒ **B** denitrification
- ☒ **C** nitrification
- ☒ **D** nitrogen fixation

(ii) Explain how plants use the nitrates from the soil.

(2)

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(iii) Describe how the over-use of nitrate fertilisers can cause eutrophication.

(4)

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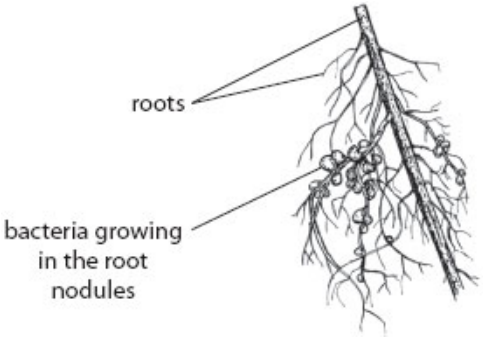
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(b) Leguminous plants such as beans and peas have bacteria growing inside nodules on their roots.

The diagram shows some nodules on a root.



Explain the relationship between this bean plant and the bacteria growing in the root nodules.

(3)

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(Total for Question is 10 marks)

Q14.

Figure 9 shows the number of organ transplants needed and the number of donors available in the USA from 1991 to 2018.

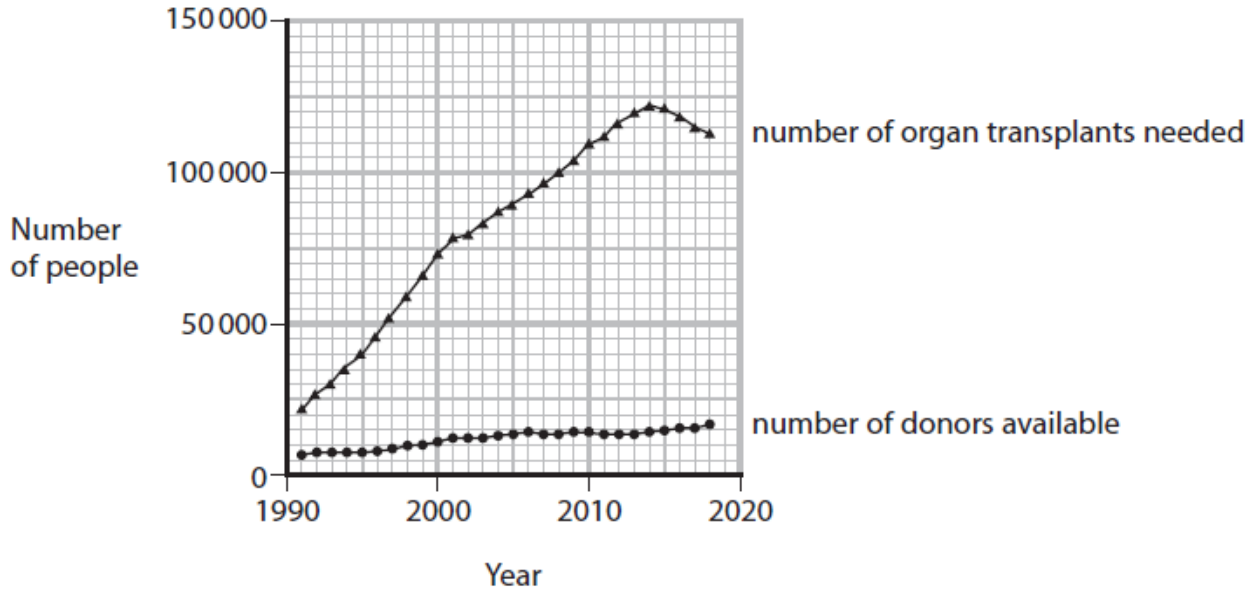


Figure 9

(i) Compare the number of donors available with the number of organ transplants needed from 1991 to 2018.

Use information from the graph to support your answer.

(3)

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(ii) State why scientists are genetically engineering animals for organ transplants.

(1)

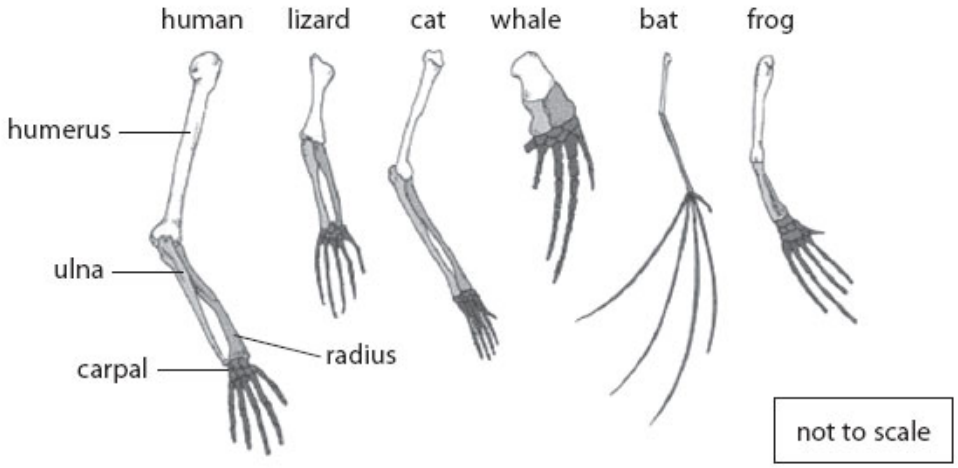
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(Total for question = 4 marks)

Q15.

The diagrams show the limbs of six organisms.



Many scientists believe that these six organisms evolved from one common ancestor.

Describe the evidence shown in the diagrams that supports this belief.

(3)

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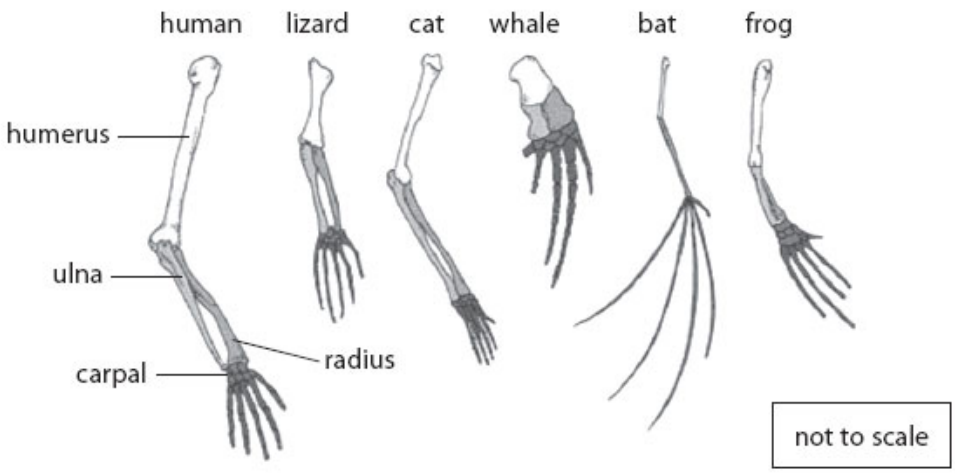
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Q16.

The diagrams show the limbs of six organisms.



Many scientists believe that these six organisms evolved from one common ancestor.

Describe the evidence shown in the diagrams that supports this belief.

(3)

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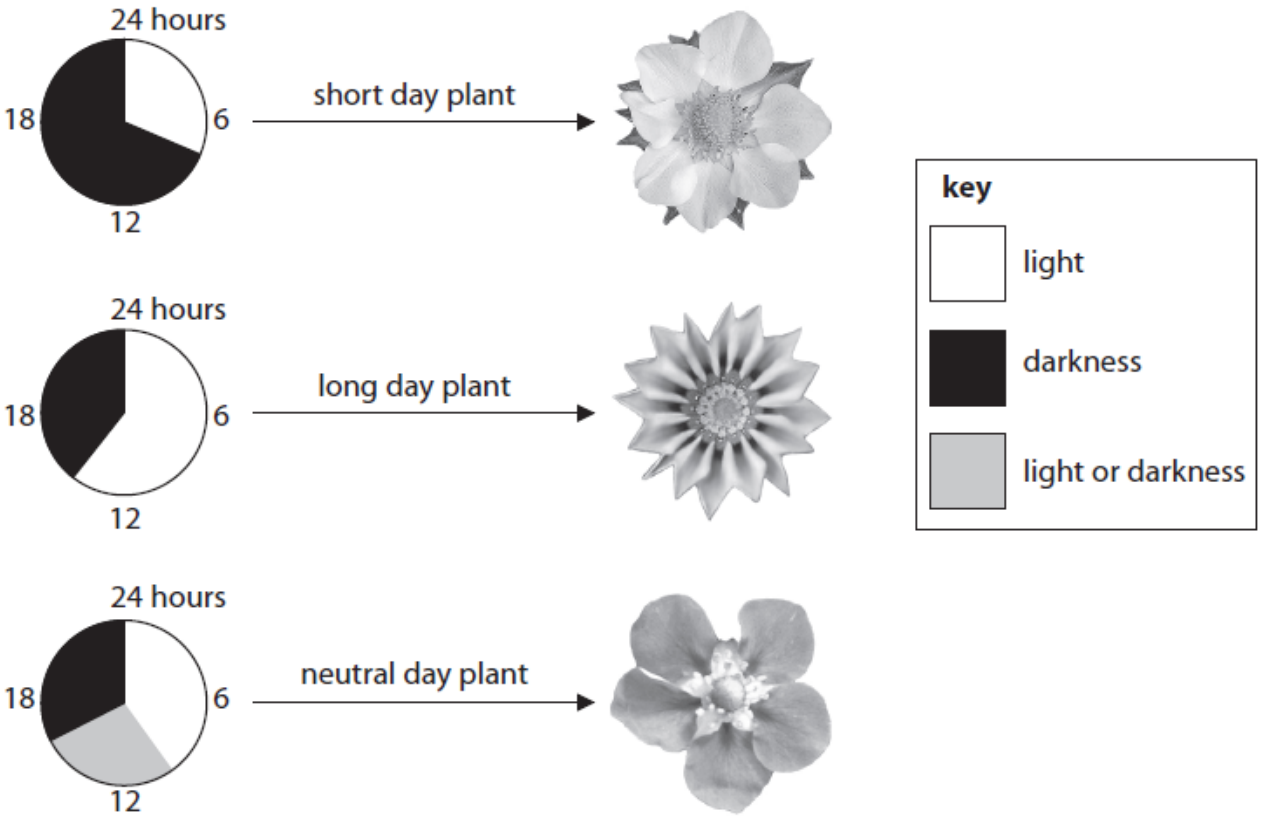
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Q17.

Plants and animals

The diagram shows the number of hours of darkness and light needed for flowering in three different plant groups.



(a) (i) State the number of hours of darkness needed for a long day plant to flower.

(1)

..... hours

(ii) A gardener has 500 short day plants.

85% of these plants flowered in March.

Calculate the number of plants flowering in March.

(2)

..... plants

(iii) Suggest a benefit to a plant of being day neutral.

(1)

.....

.....

(iv) Complete the sentence by putting a cross (☒) in the box next to your answer.

Plants flowering in response to the number of hours of darkness and light is an example of

(1)

☒ **A** circadian rhythms

☒ **B** germination

☒ **C** photoperiodism lymphocytes

☒ **D** phototropism

(b) (i) The leaves of some species of bamboo plants contain the poison cyanide.

Suggest how these bamboo plants benefit from having poisonous leaves.

(1)

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(ii) The photograph shows a greater bamboo lemur.



The greater bamboo lemur is adapted to tolerate cyanide.

This means that it can eat bamboo leaves containing cyanide.

Explain how the co-evolution of bamboo plants and the greater bamboo lemur could have occurred.

(2)

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(c) Two ethologists, Bergey and Patel, studied the call types used in communication between greater bamboo lemurs.

The table is a summary of their findings.

call types	behaviour
agitated calls	aggression
bahh calls	submission
breath out calls	aggression
contact calls	submission and aggression
purr calls	friendship and resting
squeal calls	submission
woof calls	aggression

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The behaviour associated with most call types is

(1)

☒ **A** aggression

☒ **B** friendship

☒ **C** resting

☒ **D** submission

(ii) Explain the benefit of communicating using sound rather than facial expressions.

(2)

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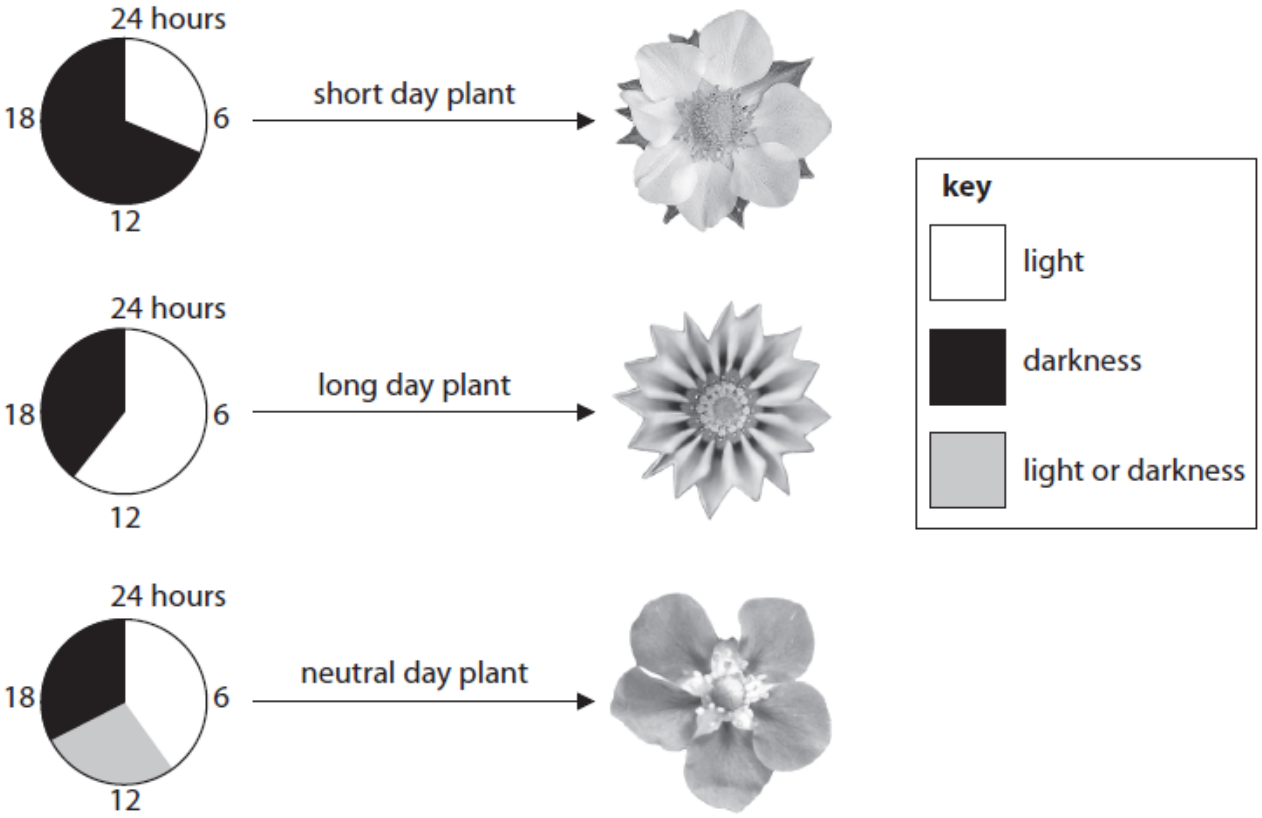
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(Total for question = 11 marks)

Q18.

Plants and animals

The diagram shows the number of hours of darkness and light needed for flowering in three different plant groups.



(a) (i) State the number of hours of darkness needed for a long day plant to flower.

(1)

..... hours

(ii) A gardener has 500 short day plants.

85% of these plants flowered in March.

Calculate the number of plants flowering in March.

(2)

..... plants

(iii) Suggest a benefit to a plant of being day neutral.

(1)

.....

.....

(iv) Complete the sentence by putting a cross (☒) in the box next to your answer.

Plants flowering in response to the number of hours of darkness and light is an example of

(1)

☒ **A** circadian rhythms

☒ **B** germination

☒ **C** photoperiodism lymphocytes

☒ **D** phototropism

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Suggest how these bamboo plants benefit from having poisonous leaves.

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The greater bamboo lemur is adapted to tolerate cyanide.

This means that it can eat bamboo leaves containing cyanide.

Explain how the co-evolution of bamboo plants and the greater bamboo lemur could have occurred.

(2)

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bahh calls	submission
breath out calls	aggression
contact calls	submission and aggression
purr calls	friendship and resting
squeal calls	submission
woof calls	aggression

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The behaviour associated with most call types is

(1)

☒ **A** aggression

☒ **B** friendship

☒ **C** resting

☒ **D** submission

(ii) Explain the benefit of communicating using sound rather than facial expressions.

(2)

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(Total for question = 11 marks)

Q19.

Corn is one of the world's most important crop plants.

Native Americans grew an early form of corn called teosinte.
Modern corn has been developed by selective breeding of teosinte plants.

Figure 3 shows some stages in the development of modern corn.

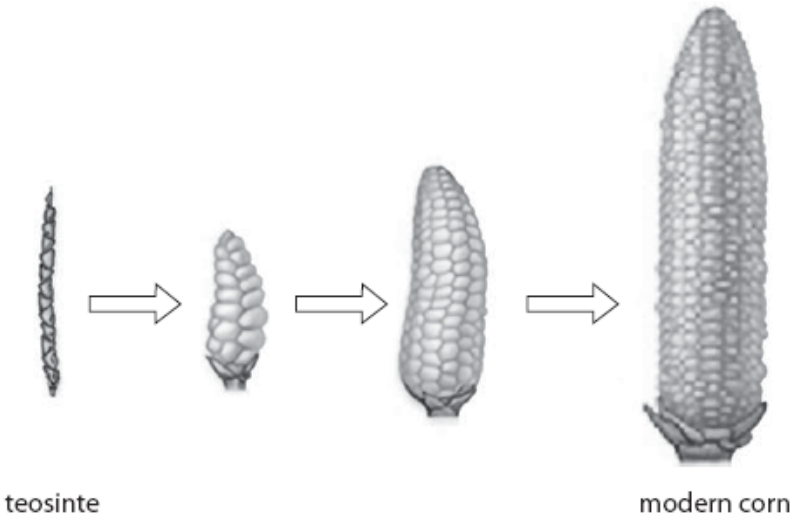


Figure 3

Give reasons why native Americans selectively bred teosinte.

(2)

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(Total for question = 2 marks)

Q20.

Resistant organisms

(a) The photograph shows the common rat *Rattus norvegicus*.



State the level of classification for both parts of the binomial name *Rattus norvegicus*.

(2)

Rattus

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norvegicus

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(b) Some rats have a mutation which enables them to eat the rat poison Warfarin and survive.

Suggest how the use of Warfarin could lead to an increase in the number of rats with this mutation.

(2)

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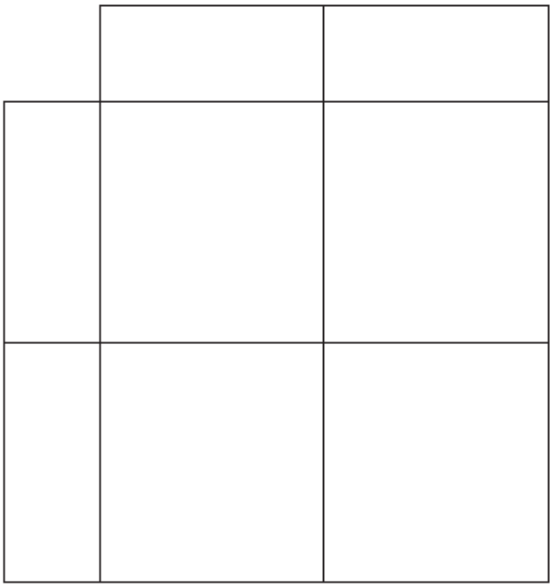
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(c) The allele for Warfarin resistance is recessive.

Complete the Punnett square to show how two rats, both heterozygous for Warfarin resistance, could produce Warfarin resistant offspring.

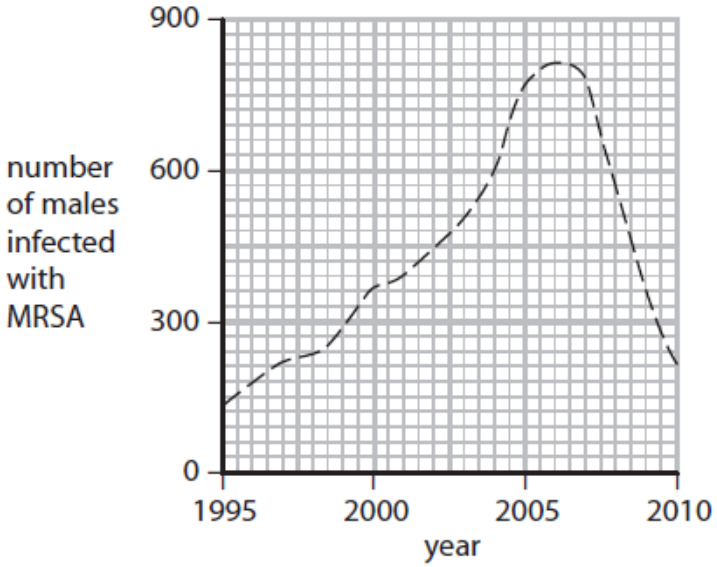
Use **R** and **r** to show the dominant and recessive alleles.

(2)



*(d) Hospitals have introduced programmes to reduce MRSA infections in patients because antibiotics have become less effective.

The graph shows the number of males infected with MRSA during their stay in hospital.



A programme of intensive use of antiseptics in hospitals has been used since 2005.

Use the information given and your own scientific knowledge to explain the trends shown in the graph.

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(Total for question = 12 marks)

Q21.

Resistant organisms

(a) The photograph shows the common rat *Rattus norvegicus*.



State the level of classification for both parts of the binomial name *Rattus norvegicus*.

(2)

Rattus

.....

norvegicus

.....

(b) Some rats have a mutation which enables them to eat the rat poison Warfarin and survive.

Suggest how the use of Warfarin could lead to an increase in the number of rats with this mutation.

(2)

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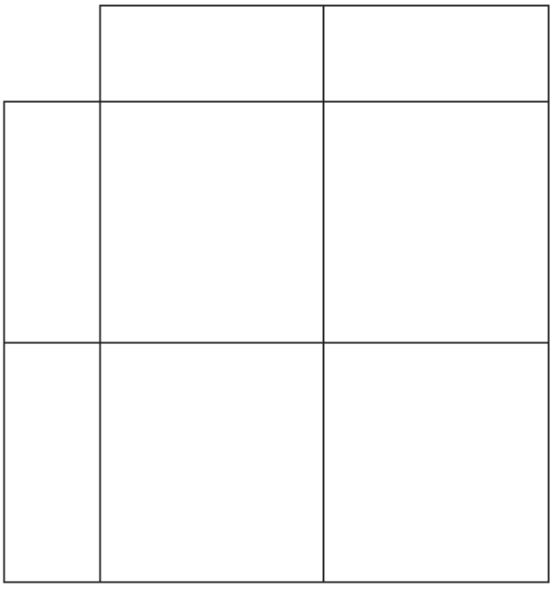
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(c) The allele for Warfarin resistance is recessive.

Complete the Punnett square to show how two rats, both heterozygous for Warfarin resistance, could produce Warfarin resistant offspring.

Use **R** and **r** to show the dominant and recessive alleles.

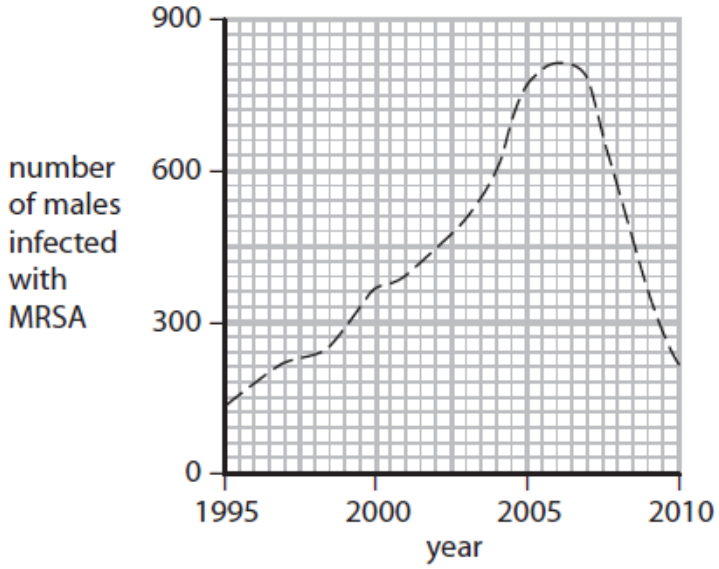
(2)



*(d) Hospitals have introduced programmes to reduce MRSA infections in patients because

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The graph shows the number of males infected with MRSA during their stay in hospital.



A programme of intensive use of antiseptics in hospitals has been used since 2005.

Use the information given and your own scientific knowledge to explain the trends shown in the graph.

(6)

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(Total for question = 12 marks)

Q22.

Figure 13 shows the pentadactyl limb of a bat and a cat.

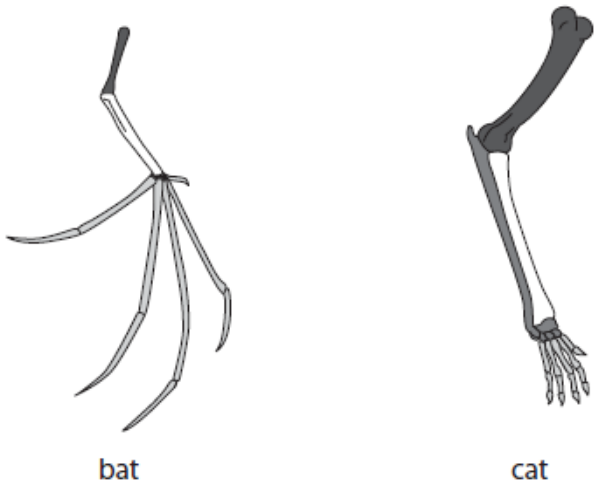


Figure 13

(i) Describe the reasons why the anatomy of the pentadactyl limb suggests that bats and cats evolved from a common ancestor.

(2)

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(ii) Genetic analysis also provides evidence for evolution.

Scientists can sequence genes from different organisms.

Describe how this type of genetic analysis provides evidence for evolution.

(2)

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(Total for question = 4 marks)

Q23.

The dodo was a flightless bird which is now extinct.

The photograph shows the skeleton of a dodo.



(i) Explain why the dodo was placed in the kingdom Animalia.

(2)

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(ii) The dodo was classified as a chordate.

Using the information in the photograph, explain why scientists classified the dodo into the phylum Chordata.

(1)

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(iii) The binomial name for the dodo is *Raphus cucullatus*.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The name *Raphus*refers to the dodo's

(1)

- ☒ **A** family
- ☒ **B** genus
- ☒ **C** order
- ☒ **D** phylum

Q24.

The dodo was a flightless bird which is now extinct.

The photograph shows the skeleton of a dodo.



(i) Explain why the dodo was placed in the kingdom Animalia.

(2)

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(ii) The dodo was classified as a chordate.

Using the information in the photograph, explain why scientists classified the dodo into the phylum Chordata.

(1)

.....

.....

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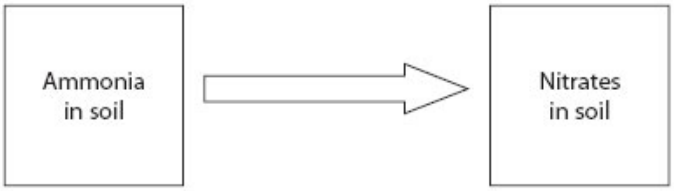
The name *Raphus*refers to the dodo's

(1)

- ☒ **A** family
- ☒ **B** genus
- ☒ **C** order
- ☒ **D** phylum

Q25.

The diagram shows one of the stages of the nitrogen cycle.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The name of this stage is

(1)

- ☒ **A** decomposition
- ☒ **B** denitrification
- ☒ **C** nitrification
- ☒ **D** nitrogen fixation

(ii) Explain how plants use the nitrates from the soil.

(2)

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(iii) Describe how the over-use of nitrate fertilisers can cause eutrophication.

(4)

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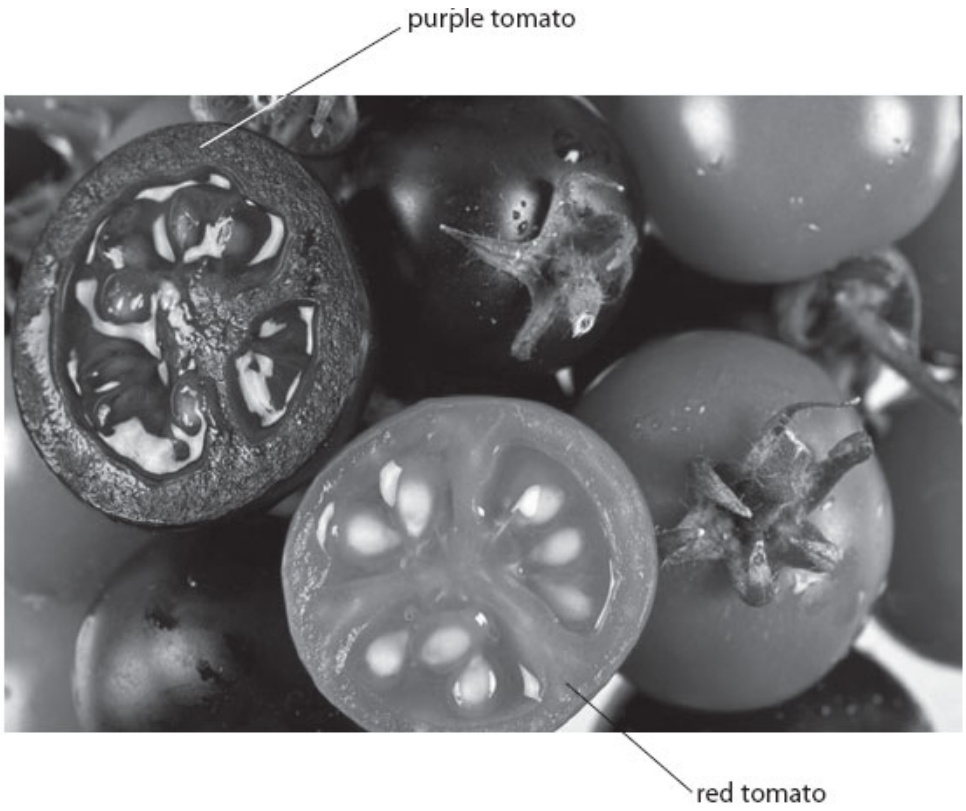
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Q26.

Purple tomatoes are transgenic plants that have been produced by genetic engineering.



(i) As a result of genetic modification, these tomatoes produce a new substance which has health benefits and turns the tomatoes purple.

Name this substance.

(1)

.....

(ii) What is inserted into the DNA of another plant to make it transgenic?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** a gene from another species

☒ **B** a gene from the same species

☒ **C** chromosomes from the same species

☒ **D** proteins from another species

Q27.

The dodo was a flightless bird which is now extinct.

The photograph shows the skeleton of a dodo.



(a) (i) Explain why the dodo was placed in the kingdom Animalia.

(2)

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(ii) The dodo was classified as a chordate.

Using the information in the photograph, explain why scientists classified the dodo into the phylum Chordata.

(1)

.....

.....

(iii) The binomial name for the dodo is *Raphus cucullatus*.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The name *Raphus*refers to the dodo's

(1)

- ☒ **A** family
- ☒ **B** genus
- ☒ **C** order
- ☒ **D** phylum

(b) The dodo lived on the small island of Mauritius. It became extinct in 1681.

Using your knowledge of natural selection, suggest why the dodo may have become extinct.

(3)

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(c) Complete the sentence by putting a cross (☒) in the box next to your answer.

The formation of a new species due to geographical isolation is called

(1)

☒ **A** adaptation

☒ **B** competition

☒ **C** hybridisation

☒ **D** speciation

(d) Describe the causes of variation in a population.

(2)

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(Total for Question = 10 marks)

Q28.

The dodo was a flightless bird which is now extinct.

The photograph shows the skeleton of a dodo.



(a) (i) Explain why the dodo was placed in the kingdom Animalia.

(2)

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(ii) The dodo was classified as a chordate.

Using the information in the photograph, explain why scientists classified the dodo into the phylum Chordata.

(1)

.....

.....

(iii) The binomial name for the dodo is *Raphus cucullatus*.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The name *Raphus*refers to the dodo's

(1)

- ☒ **A** family
- ☒ **B** genus
- ☒ **C** order
- ☒ **D** phylum

(b) The dodo lived on the small island of Mauritius. It became extinct in 1681.

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The formation of a new species due to geographical isolation is called

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☒ **C** hybridisation

☒ **D** speciation

(d) Describe the causes of variation in a population.

(2)

.....

.....

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.....

(Total for Question = 10 marks)

Q29.

Corn is one of the world's most important crop plants.

Native Americans grew an early form of corn called teosinte.
Modern corn has been developed by selective breeding of teosinte plants.

Figure 3 shows some stages in the development of modern corn.

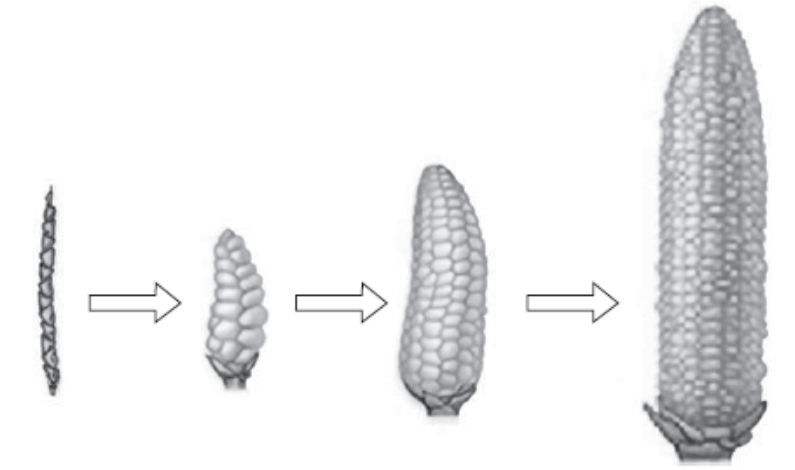


Figure 3

Explain why restriction enzymes are used in the process of genetic engineering.

(2)

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(Total for question = 2 marks)